

## WHAT IS CLAIMED IS:

1. A method of dynamically determining a Raman gain profile of an optically amplified fiber optic span, said method comprising the steps of:
- 5 measuring a power profile for each of a plurality of system components;
- transmitting the measured power profiles to a central location;
- transmitting changes in the measured power profiles to the central location; and
- 10 dynamically calculating the Raman gain profile for the system based on the changes in the measured power profiles.
2. A method according to claim 1 further comprising, before said step of measuring a power profile for each of a plurality of system components, the step of:
- 15 applying one or more Raman pumps to said fiber optic span for providing additional optical amplification thereto.
3. A method according to claim 2 wherein power settings for the Raman pump are calculated relative to a loss profile of a fiber optic span measured under non traffic-carrying conditions in order to achieve a specified Raman gain profile.
- 25 4. A method according to claim 2 wherein said step of measuring a power profile for each of a plurality of system components includes measuring: an originating profile at an output of a transmit amplifier, a loss profile of a fiber optic span, and an incident profile at an input of a receive amplifier.
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5. A method according to claim 4 wherein if the incident profile changes, and it is known that the originating profile remains unchanged and the output power monitor conditions remain unchanged on the Raman pumps, it may be determined that changes in the measured power profiles have occurred along the fiber optic span.

6. A method according to claim 1 wherein the step of transmitting changes in the measured power profiles comprises conveying basic information over an overhead channel.

7. A method according to claim 1 wherein the step of transmitting changes is performed when the magnitude of the change is outside limits defined by a tolerance band.

8. A method according to claim 1 wherein said step of measuring a power profile for each of a plurality of system components includes measuring: an originating profile at an output of a transmit amplifier, a loss profile of a fiber optic span, and an incident profile at an input of a receive amplifier.

9. A method according to claim 8 wherein the step of transmitting changes comprises conveying a status update on a regular basis from the transmit amplifier.

10. A method according to claim 8 wherein said step of dynamically calculating Raman gain profile comprises summing updated values of the incident profile and the loss profile, and subtracting therefrom the originating profile.

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11. A method according to claim 8 wherein said step of dynamically calculating the Raman gain profile is performed at said receive amplifier.

5 12. A system for dynamically determining a Raman gain profile of an optically amplified fiber optic span, said system comprising:

10 a plurality of optical spectrum analyzers for measuring power profiles of said fiber optic span and of a plurality of system components so as to determine the existence of a loss or a gain therein;

means for receiving the measured power profiles from the optical spectrum analyzers, and for receiving changes in the measured power profiles; and

means for dynamically calculating the Raman gain profile for the system based on the changes in the measured power profiles.

20 13. A system according to claim 12 further comprising an overhead channel for conveying the changes in the measured power profiles.

25 14. A system according to claim 12 further comprising a display means for displaying the result of said calculation.

15. A system according to claim 12 wherein the means for receiving comprises a processor.

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16. A system according to claim 12 wherein the means for dynamically calculating comprises a processor.

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17. A system according to claim 12 wherein the means for receiving and the means for dynamically calculating are integral with one another.

5 18. A system according to claim 12 wherein said system components include a transmit amplifier and a receive amplifier.

10 19. A system according to claim 18 wherein said means for receiving and said receive amplifier are integral with one another.

20. A system according to claim 17 wherein said means for receiving, said means for dynamically calculating, and said receive amplifier are all integral with one another.

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